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VOLUME XXXI SAN FRANCISCO, AUGUST 23, 1913 NUMBER 8

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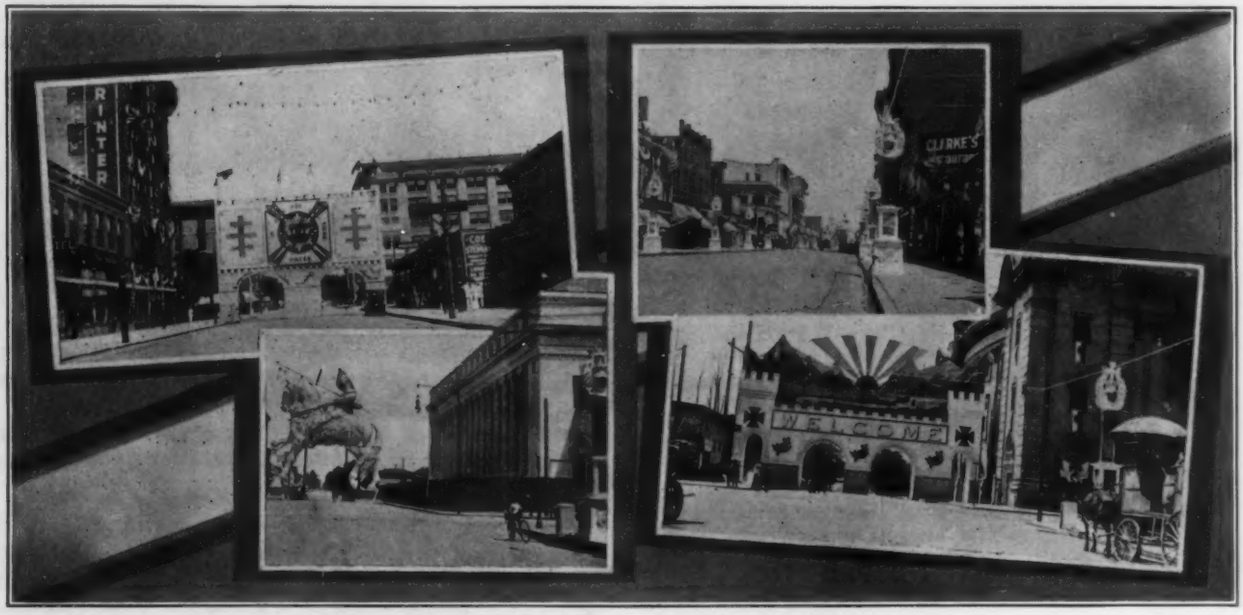
ILLUMINATION AT TEMPLAR'S DENVER CONCLAVE

Some remarkable lighting effects were secured during the thirty-second triennial conclave of the Knights Templar at Denver, Colo., August 11-16. Their slogan "In Hoc Signo Vinces," in combination with Cross and Crown, figures of knights on horseback, was in evidence at all points of vantage during the week. The business district was transformed into a gallery of radiant colors by day, and a maze of dazzling, gleaming, vari-colored lights after 7:30 p. m. Conspicuous among the attractions were the following:

The Court of Honor on Champa street, extending from 14th to 18th, studded with forty-eight columns, each thirty-six feet high, lighted by electricity, crowned with a golden harp, reflecting a variety of dancing, shimmering colors from jets of water which gushed forth within the glass cylinders forming the upper half. These columns were symbolical of the forty-eight states.

At the Fourteenth-street end of the Court of Honor, powerful searchlights operated by a special device upon a framework built for the purpose, occupied the entire width of the street depicted the glory of a Colorado sunset, a realistic picture of the setting sun with rays stretching a thousand feet into the air against a dark background, and the word "Welcome" spelled out with 500 miniature lights.

The street illumination was arranged with festoons of red, white and blue lights hung in portiere fashion across Fourteenth street, three clusters to a block.



Views of the Decorative Effects at Knights Templar Conclave.

On Fifteenth street were rows of twenty 18-in. stars with white cross in the center and large arc lights enveloped in silver flitter. On the trolley poles were figures of the cross and crown outlined in papier-mache, surrounded by drapery of bunting, stars and stripes, four rows to each block.

On Sixteenth street, the red maltese cross was suspended in the center of two strings of red lights, between which was entwined, and caught up in loops five strands of silver tinsel.

In the business section where the regular wires were not capable of carrying the additional current required, extra cables were temporarily placed on the trolley poles, and special dynamos installed in the power house to re-enforce the permanent lighting system.

ELECTRICAL CONTRACTORS' CONVENTION.

The fourth annual convention of the California State Electrical Contractors' Association held at the Hotel Potter, Santa Barbara, California, August 14-16, will go down in history as one of the most successful and enjoyable yet held. While previous conventions have surpassed it in point of attendance none was of more direct value to those in attendance nor has any previous meeting laid the foundation for so much development in the year to come. The total attendance of electrical contractors and their guests was close to one hundred.

Wednesday, the 14th and Thursday, the 15th, were devoted to business meetings open only to the contractors. Motor rides throughout the beautiful country surrounding Santa Barbara were enjoyed by the ladies and on Thursday evening a boat ride along the coast was taken by the entire party.

Officers for the ensuing year were elected as follows:

President—C. V. Schneider, Sacramento.
First Vice-President—Claude Lovejoy, Santa Barbara.
Second Vice-President—George Sittman, San Francisco.
Secretary-Treasurer—W. S. Hanbridge, San Francisco.
Sergeant-at-Arms—Frank Somers, San Jose.

Sacramento was chosen as the next meeting place. Arrangements were made to carry on a vigorous campaign for new members during the next year, a prize of $50 being offered to the one getting the largest number to join.

C. F. Butte presided at the open meeting on Friday, the 15th. First on the program was an address about the Society for Electrical Development by A. H. Halloran. This was followed by a paper on the "Mutuality of Interest Between the Electrical Contractor and the Central Station," by J. P. Huntington. R. B. Clapp spoke on the Jovian Order and the secretary read a paper from John C. Austin on the "Relation of the Architect to the Contractor." In the afternoon J. B. Hyde spoke on State Regulation of Fire Alarm Installation, and J. R. Malony presented a paper on Compensation Laws. Several of these papers are published herewith. The annual dinner was held in the Moorish Room of the Hotel Potter on Friday evening, the time being pleasantly spent with feasting, song and story.

Saturday was devoted to athletic sports, with a Jovian rejuvenation in the evening. A five-inning baseball game in the morning between the Jobbers and the Contractors, resulted in a score of 17 to 9 in favor of the former, the jobbers making nine runs in the last inning. Fulton and Neelands were the battery for the jobbers and Arbogast and Jacobs for the contractors. Arbogast also pitched for the Southern Contractors in their game against the Northern Contractors in the afternoon, Spaulding catching for the Southern crowd, while Snyder and Hope did the honors for the North. The score was 5 to 1 in favor of the South after four innings. A barbecue lunch was served between the games and greatly enjoyed by all present. In the afternoon various other contests were held for which handsome prizes were awarded the fortunate winners.

Jovian Rejuvenation.

The rejuvenation on Saturday night was a notable exemplification of the spirit of co-operation inculcated by the Jovian Order. Statesmen and officers from Los Angeles and San Francisco got together in staging one of the most impressive ceremonies yet produced on the Pacific Coast. Each officer had memorized his part and delivered it in a most effective manner. From Los Angeles Statesman R. B. Clapp provided Jupiter, Pluto, Mars and four imps, while from San Francisco Statesman A. H. Halloran furnished Neptune, Vulcan, Apollo, Hercules, Mercury and Avrenim. Great credit is due to the men who so admirably occupied these positions, particularly to Statesman-at-large J. G. Pomeroy, who performed the executive duties of Jupiter in a most acceptable manner and was otherwise an active worker, as well as to Statesmen-at-large H. E. Sanderson, M. F. Steele and Statesman C. V. Schneider. Great personal sacrifices were made by several, E. B. Strong having come from San Francisco for the sole purpose of taking his part as Neptune.

The following officiated at the respective stations:

Jupiter—J. G. Pomeroy; Mercury—J. A. Vandegrift; Neptune—E. B. Strong; Mercury—H. E. Sanderson; Pluto—T. E. Burger; Apollo—M. L. Scobey; Vulcan—A. H. Halloran; Avrenim—Geo. A. Gray; Mars—A. L. Spring; Imps—B. C. Chase, W. L. Neelands, W. A. McNally, Phil Levy.

At the conclusion of the ceremony Statesman R. B. Clapp gave a strong address upon Co-operation; remarks also being made by Statesman Schneider and Halloran.

The following candidates were initiated into the mysteries of the order:

W. R. Edwards, Pacific States Electric Company, Los Angeles; L. J. Fraser, S. W. Surety Insurance Company, San Francisco; J. C. Jacobs, Jacobs Electric Company, Pasadena; T. L. Jepson, Jepson Salisbury Company, Ventura; J. H. Mosely, Journal of Electricity, Power and Gas, San Francisco; D. L. Reynolds, Reynolds Electric Company, Los Angeles.

Following is a list of the registrations at the Convention:

F. J. Airey
Mr. & Mrs. G. E. Arbogast
G. F. Becker
Mrs. Bergman
Mr. & Mrs. E. F. Burkhart
Mr. and Mrs. C. F. Butte
W. E. Camp
J. M. Carlson
Benjamin C. Chase
Mr. and Mrs. R. B. Clapp
C. K. Cooper
Mr. and Mrs. C. C. Davis
W. R. Edwards
Mr. and Mrs. E. J. Field
A. R. Fierce
Mr. & Mrs. C. G. Frankish
L. C. Fraser Jr.
Alexander Fulton
G. Gans
Geo. A. Gray
S. B. Gregory
A. J. Hall
C. B. Hall
W. B. Hall
A. H. Halloran
Mr.&Mrs. W. S. Hanbridge
M. C. Hixson
Mr. and Mrs. N. M. Hope
P. B. Hyde
Mr. & Mrs. Jno. C. Jacobs
F. L. Jepson
C. E. Kenyon
W. W. Lane
F. O. Lantz
Mr. and Mrs. Phil Levy
G. Loveberg
Mr. & Mrs. Claude Loveday
W. R. Lyall
J. R. Maloney
Mr. & Mrs. R. J. McHugh
W. A. McNally
Miss Emma Meyer
Mr. & Mrs. F. S. Mills
J. H. Moseley
F. H. Murray
Mr. & Mrs. W. L. Neelands
H. T. Nielson
Mr. & Mrs. Wylie Nielson
L. A. Nott
M. W. Phillips
J. G. Pomeroy
F. B. Potter
Miss Hazel M. Pritchard
N. W. Reed
Mr. & Mrs. C. A. Renard
Mr. & Mrs. J. C. Rendler
Duncan L. Reynolds
Mr. & Mrs. J. S. Reynolds
H. E. Sanderson
H. A. Sayles
Mr. & Mrs. C. V. Schneider
M. L. Scobey
H. G. Shepherd
G. A. Sittman
A. Allen Smith
Mr. & Mrs. F. J. Somers
G. E. Spaulding
Arthur L. Spring
Miles F. Steel
W. M. Stockwell
E. B. Strong
Lewis Switzer
Chas. L. Turner
J. A. Vandegrift
V. A. Welch
Miss Vencent Welch
W. T. Yost
Carl Young

MUTUALITY OF INTEREST BETWEEN THE ELECRICAL CONTRACTOR AND THE CENTRAL STATION.

BY J. P. HUNTINGTON.

The question of mutuality of interest is of paramount importance to all the branches of the electrical industry and when it is defective in one branch of the industry, all of the other branches are hurt in consequence. This burden of mutuality cannot be carried successfully by one or more branches and ignored by the others. I am reminded of the story about the farmer who had a pair of horses. He was asked if his team was a willing one and his reply was, "Yes, one is willing to do all the work and the other is willing to let it." In the electrical business in the past, we have sometimes seen one branch of the industry willing to do that co-operating and the other branch willing to take the benefits but not so willing to carry its share of the burden.

Members and Guests at California State Electrical Contractors' Convention.

However, conventions like this and discussions of this order are what will bring about a condition which we all desire. My impressions are based on a year of central station operation in Southern California, following a number of years in the same line of work in four of the Eastern States. I have found conditions on the Pacific Coast in all branches of central station work to be different from the conditions existing in the older part of this country, and this difference extends to the mutual relations existing between the contractor and the central station companies. I have found the electrical contractor on the Pacific Coast, as a class, to be up to date, energetic, efficient, reliable, and possessed to a large degree of that initiative so necessary in any business. In all these things I feel that he averages higher than his Eastern brother and I assure you that one of the many pleasures I have experienced through my change of location has been due to the better relations existing between the electrical contractor and the central station, and the better understanding of the mutual interests that exist.

The mutuality of interest between us may be summed up in one word which embraces the whole subject—Co-operation. Co-operation is the first as well as last great duty that we owe to each other, and an actual necessity to the carrying on of our separate businesses. Co-operation is the solid foundation without which we cannot build the substantial structure of success—or—Co-operation is the double harness which allows us each to put our shoulders against the collar and pull evenly together for the success of both.

A constant study of co-operation should be the practice of us all, and a constant observance of co-operation should be the habit of all. Through co-operation we can attain the highest degree of successful service. Successful service produces a satisfied customer, and a satisfied customer is the greatest asset that either of us can have.

In good service we have an important item of mutual interest. Good service to a customer on the part of one of us is of great advantage to the other; in fact, each of us is bound to depend on the other for good service to the customers we jointly serve. The central station carries its lines to the wall of a customer's building, and there transfers the "juice" to the lines installed by the contractor. It is through the lines, fixtures and appliances furnished by the contractor within the building that the electric current furnished by the central station is carried and translated into light, heat, or power, as may be desired by the customer. If the central station renders poor service, the customer will become dissatisfied, and in some cases the relation of cause and effect may not be apparent to him, so he may wrongfully lay the blame on the contractor who did the wiring or furnished the appliances. Likewise, if the contractor has not rendered good service in properly wiring the premises or in the appliances furnished, the central station may get the blame. In either case the use of electricity may be discredited, which is to be regretted by both of us.

Our mutual interest is, that the home, the shop, the store and all the other places where men work, or play, or rest, shall be supplied with electric service and the conveniences that go with it. But here is only the beginning, for continuing from the first installation the customer will constantly require not only the daily service of electric current from the

central station, but very frequent service from the contractor in the way of appliances, extensions in one way and another, and his supply of those things that are consumed in use.

Another mutual interest is that the customer shall have an efficient installation, that he shall get a maximum of result from the current he uses, and a maximum of convenience from the appliances he secures. Unfortunately the ordinary customer has to be constantly educated, and in fact, sometimes fairly coaxed, to realize that improved appliances are an economy to him. Then there is another class that will obtain an appliance, and when some small matter goes wrong with it will lay it aside and return to an old method. How many times we have all known a flat iron to be condemned because of worn contacts in the attaching plug, or a broken strand in the cord.

The greatest correspondence school of education in this country, and that means the greatest in the world, found early in its history that many persons would carry the course along one or two lessons and then quit. This condition became so serious as to threaten the success of the business, and so the plan was adopted of seeking out the faint-hearted ones and helping them over the rough spots; and this is what you must do, and we must do, with our customers. In fact, it is to our mutual interest to join together in a constant effort to see that our customers ge. the full service they should, in every respect.

In the East you constantly hear of house-wiring campaigns, and especial inducements are offered by central stations for the wiring of old houses. In this territory there is nothing of this kind, due to the fact that the old houses were all wired long ago, and the electrical contractors see to it that the new ones are wired as they go up. So this house-wiring matter is one that the central station manager out here does not have to worry about, and I for one give full credit to the electrical contractor for this happy result.

We also have a mutual interest in educating the public, by disabusing his mind of the many ideas resulting from ignorance or carelessness of thought. We don't have to tell people what electricity is, but what it will do, and how it may be used to save time, to save trouble, and to smooth away many of the difficulties and inconveniences of life.

Before I close, I want to call attention to one thing in which we can co-operate and which it is to our mutual advantage to do so in the education of the public. At the time of my earlier recollections there was no electric wiring, and gas was quite rare except in the heart of the larger cities. In that day if there was a fire and the cause was not definitely known, the paper usually attributed it to a "defective flue," but if it was in summer when stoves were only used for cooking, they would sometimes say the fire was probably caused by "rats gnawing matches." Now-a-days these old causes have fallen into disuse, and in almost every case the cause is given as defective electric wiring. I think electrical contractors can see where it is to our mutual advantage to oppose the indiscriminate blaming of fires on to the electric wiring. Spontaneous combustion is little believed in and seldom mentioned, and many other equally probable causes of fire are neglected, but to me it seems only just that the electric wiring be not condemned until it is proven guilty, and I hope you will all work to thie end.

In the foregoing I have tried to express the thought that the Mutuality of Interest between us is in Co-operation, to the end that the best of service may be rendered by us to the public, and that the best service includes the education of our customers to their advantage, and a reasonable watch over their needs and uses of what we have to offer. Modern practice in the serving of electricity, and the installation of lighting, power, and heating equipment, has become so standardized that there is little occasion for any differences to arise, but there is a refinement of service that can be realized by co-operation which will produce a harmonious result highly beneficial to us all.

THE RELATION BETWEEN THE ARCHITECT AND THE CONTRACTOR.

BY JOHN C. AUSTIN.

The relations that existed between an architect and an electrical contractor a few years back were very unsatisfactory for several reasons—the first being that most architects did not know the rudiments of electricity, and as a consequence had to rely on the knowledge of the electrical contractor, and generally the one who submitted the lowest bid (owners seldom accept any other). The man submitting the lowest bid is not always an embryonic Edison; very often he is a financial fool who has simply counted up the number of outlets, and guessed what it would cost to give a result that would pass the inspection of the architect (who was, as I said before, densely ignorant of the subject) for the smallest amount possible.

After the contract was awarded and the work was started, the contractor's assumed profits began to look microscopically small, so he would then invade some kindergarten and employ labor from that source. He would watch these students work (somewhat as Tom Sawyer watched his playmates paint the fence), and then when it was done, he would apply for his certificate. The architect would then inspect the work, make a few kicks for form's sake, and then issue the certificate; saying that the work was all right, but not saying anything about the beneficent Providence wh- in most cases looked over it all and gave both architect and contractor the benefit of the doubt.

Another cause of trouble was the practice pursued by some architects of letting the contract for electric wiring to a general contractor, who would then have to sub-let the wiring and other electrical work to an electrical contractor. The general contractor would always feel bound to let the electrical work to the man who could string the most wire for the least money; this, on the face of it, was a poor method as money was the one gauge by which everything else was measured.

It is obvious that an architect cannot master every branch of electricity any more than he can master all of the technical details of plumbing, painting, stone-masonry, and the numerous other items which are necessary to complete the modern building. The wise architect (and he is generally over thirty) when

he has an important building to undertake, will consult with experts in every important branch, and in so doing he will get in touch with the latest appliances and will have a specification that, when it is read, will not bring a smile to the face of the one who knows. It goes without saying, that a carefully prepared set of plans and specifications in which nothing is left to the imagination will give the owner what he wants at a reasonable figure and the contractor will be able to figure a profit.

The demands for electrical apparatus are so numerous and important that the work of an electrical contractor should be independent of that of the general contractor, and he should be treated as an original contractor instead of as a sub-contractor. When an architect lets all of his so-called sub-contracts to what is known as a general contractor, he is simply trying to save trouble to himself; and in saving himself the immediate trouble, he is not conserving the interests of his employer (the owner), but is breeding trouble and consequent dissatisfaction for every one concerned.

The general contractor knows nothing about electricity; then why should he be employed, and why should the owner pay a double profit? By a double profit, I mean profit for the electrical sub-contractor and the other profit being for the general contractor who is supposed to shoulder all responsibility, which responsibility generally consists in figuring a large amount for the wiring and sub-letting it for the smallest amount possible without reference to quality.

Since the electrical contractor has assumed such importance, and since there is in every town an association of master electricians, I think it would be a wise move for each association to have a committee of experts upon whom the architects could call for advice. In the event of trouble and dispute this committee could be called upon to state in an impartial way whether the electrical contractor had fulfilled honorably and fairly the terms of the contract, or whether he had slighted the work. This committee should be composed of men who would render a decision without fear of their colleagues or of the architect.

In the event of the committee finding that the electrical contractor was doing "shoddy" work, then this contractor should be punished, and possibly expelled from the association. When the architects found that the association stood only for straight, honorable, and efficient work, and that the dishonest practitioner would have no place in its ranks; then a membership in such an association would be of great value to its members, and one would think seriously before venturing on transgressing its rules.

I know that it might be said that there would be collusion between the members; but if there was collusion, it would soon leak out, and the association would have done more damage to the cause of uplifting the business of electrical contractors than the few dollars gained by collusion could do good; and the association would soon be a thing of the past.

In a large city this organization could save vast amounts in the following way: Almost every manufacturer sends out samples of the goods he has to sell to the architects, who in a great many cases promptly lose them; and when they find them again, wonder what on earth they are for, as the literature that came with the samples has been relegated to the waste-basket.

If the association could arrange to receive samples and to classify them, the architects would get into the habit of visiting its headquarters from time to time for the purpose of education. Usually the "drummer" manages to call when the architect is immersed in something else; and while the goods that he represents will be of the utmost importance at some future time, the matter is pushed aside for the more pressing needs of the present. If samples of all electrical appliances were filed at the headquarters of the association after the architects had seen them, they would then go there for full particulars when the need became a pressing one.

The manufacturers could pay a small fee for the privilege of filing the samples of their goods with the association; and in doing so they could be sure that their samples were not either stowed away in a cupboard where they could not be found, or lost entirely. These fees could be used to defray the rent and secretary's wages.

The time of the specialist has come in every walk of life, and the expert electrical contractor will have to be recognized as a specialist and as an independent contractor by every architect and owner.

WATER POWER FOR LUMBERING.

A final permit has also been granted to E. P. Ash and Sam Samson of Stevenson, Washington, the power to be used in logging operations in the vicinity of Wind River. The water power project, which utilizes the flow of Wind River, is located entirely on national forest land of the Columbia forest and is about 30 miles northeast of Stevenson. By means of a timber crib dam, about 10 ft. in height, water will be diverted into a wood-stave pipe 4 ft. in diameter, in which it will be conveyed a distance of about one mile to the pressure pipes and the wheels. At the power house there will be installed one 750 kw. unit, direct connected to a Pelton wheel.

HYDRO-ELECTRIC POWER PERMITS.

A water power permit has been granted recently by the secretary of agriculture to the Oro Electric Corporation of California. By this permit the company is allowed to use certain lands of the Plumas national forest, near Oroville, Cal., in the development of hydroelectric power.

Under the permit the power is developed at what is known as the Lime Saddle plant, to which the water is conveyed by means of the Miocene and Nickerson ditches through the Kunkle reservoir. After equalization in this reservoir it is carried to the plant by a pressure pipe about a mile long, where a static head of 478 ft. is obtained. The powerhouse is equipped with two 1000 kilowatt units, driven by two Pelton wheels at a speed of 400 revolutions per minute. At the generators the voltage is 2300, this being increased to 30,000 volts for transmission to the market.

ELECTRICAL PUMPING AND IRRIGATION

APPLICATION OF WATER TO THE LAND.

BY B. A. ETCHEVERRY.

The diversion works, diversion canal, the distribution system and the many irrigation structures which form an irrigation system, are necessary to convey and deliver to the farm or orchard the water necessary to irrigate it. The proper distribution of the water and its application on the farm by the irrigator requires skill and knowledge. Of the water delivered it has been estimated that from 1/3 to 1/2 is lost through evaporation during the application of the water and after, when it passes from the wet soil to the dry air, and from deep percolation beyond the ends of roots. These losses can be largely eliminated by skillful application and thorough cultivation at the right time. The methods of application and distribution will depend much on the value of water, the volume to be handled, the kind of crops and the topography of the land.

The water is conveyed to the different parts of the farm in one of the following forms of conveyor: earth ditches, wooden flumes, concrete flumes, cement pipes, wooden pipes, steel pipes, canvas hose, etc. The water is applied to the soil usually by one of the following methods:

1st. The furrow method. 2d. The flooding method, by overflowing parallel field ditches. 3d. The flooding method by means of basins or checks, which may be either rectangular checks, contour checks, border checks. 4th. The flooding method by using slip joint pipe or canvas hose.

These methods of conveyance and application are well described in a number of bulletins prepared by the Irrigation Investigations of the U. S. Department of Agriculture, a few of these bulletins are:

Farmers' Bulletin 263, Practical Information for Beginners in Irrigation.

Farmers' Bulletin 373, Irrigation of alfalfa.

Farmers' Bulletin 392, Irrigation of sugar beets.

Farmers' Bulletin 399, Irrigation of grain.

Farmers' Bulletin 404, Irrigation of orchards.

Office of Exp. Sta. Bulletin 177, Evaporation losses in Irrigation and Water Requirements of Crops.

O. E. S. Bulletin 203, Distribution of Water in the Soil in Furrow Irrigation.

Separate 495, Soil Mulches for Checking Exaporation.

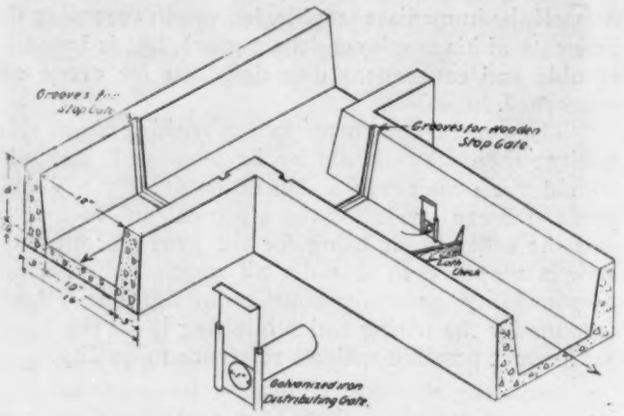
Separate 514, Methods of Applying Water to Crops.

Document 1221, Review of Ten Years Irrigation Investigations.

In Southern California the high value of water has developed skillful and economical methods of distributing water and regulating the flow into furrows. Two methods are largely used, one being the concrete or cement flume distribution system and the other the cement pipe distribution system. The latter is now being adopted in other arid states. These methods are only briefly described in the government bulletins and for this reason a more complete description is given.

Concrete Flume Distribution System.

The leaky earth ditches and the short life of wooden head flumes has led most of the orchardists of Southern California to use either concrete flumes or cement pipes. A concrete head flume is made of the same form as the wooden flume, galvanized iron spouts or tubes from ¾ to 1½ in. in diameter being inserted in the side of the flume before the concrete has hardened, there being one spout for each furrow. On steep slopes, where the velocity is high, to give an even distribution through the spouts, checks made of short pieces of lath are inserted below each opening as shown in the accompanying sketch. To hold the checks in place one end of the lath fits into a groove



Junction of Concrete Distributing Flumes.

cut in the side of the flume by means of a trowel before the concrete is hard. The thickness of the floor for all sizes up to 24 in. in width is 2 in. The side walls for all depths up to 12 in. are 2½ in. thick at the top and 3 in. at the bottom. The flumes are made almost any size. The dimensions and cost of some of the sizes commonly used in Southern California are as follows:

Bottom width inches.	Depth inches.	Cubic feet of concrete per lineal foot of flume.	Cost per lineal foot in inches.
8	11	.54	20
9	12	.60	22
10	12	.63	24
10	14	.66	25
10	16	.69	26
10	18	.71	27
10	20	.74	28
10	22	.77	28½
10	24	.80	29
12	12	.71	25
12	14	.74	26
12	16	.76	27
12	18	.79	28
12	20	.82	29
12	22	.85	29½
12	24	.88	30

The cost of labor and material for which the above costs were obtained are: labor $2 to $2.50 for 9 hours, cement $3.50 a barrel, and gravel $1.50 a cu. yd.

The flumes are constructed on the ground by using a set of forms or moulds into which the concrete is placed. The moulds consist of an inside bottomless trough similar to the form used for lining ditches, but made with the same dimensions as the inside of the flume, and outside walls or sheathing held the proper distance apart from the inside form

by means of spacing blocks and heavy U shaped iron, straddling over the outside wall and inside wall. Instead of the U shaped iron the outside walls could be held in place by stakes driven in the ground. To build the floor and sides at the same time the inside walls are held above the ground by the spacing frames a height equal to the thickness of the floor. The flume is built in sections 12 ft. long, which is the length of the forms. No provision is made for contraction and small shrinkage cracks may occur. These could be eliminated by inserting at the edges a metal tongue 2 or 3 in. wide imbedded about half way into each section. This tongue should be well painted with oil or soap to prevent the adhesion of the concrete and it will then act as a tongue and groove joint.

Concrete Distributing Flume for Orchard Irrigation in Southern California.

To permit the quick removal of the forms, which is necessary unless sufficient forms are used to build a considerable length at one setting, the concrete is mixed comparatively dry and requires careful tamping. A mixture of 1 part of cement to 5 of well graded pit gravel is generally used. It is important that the concrete be kept moist by sprinkling, or otherwise, for a period of at least one week. When completed the side walls are partly backfilled with earth up to about one-half of their height. It is better to have the spouts at least 4 in. long, preferably 6 in. to prevent the washing away of the soil from under the flume, by the action of the water coming out of the spout, which will cause it to settle and crack. These galvanized iron spouts are made by local metal workers at a cost of 4¾ to 5¼ cents each.

A new use for transmission towers has been found by forest rangers who find them helpful as fire lookout stations in the national forests traversed by high tension transmission lines.

Permutit is a compound for softening water which is prepared by smelting aluminum silicates with sodium carbonate and sand. It has the property of exchanging its sodium base for calcium or magnesium, by which means all hardness is removed from the water. Iron manganese and organic matter can also be removed similarly. It can be regenerated indefinitely by passing salt water through a filter made up of this material.

HYDRAULICS. II.

BY OTTO B. GOLDMAN.

The Determination of Stream-Lines (Case 1, Velocity Function Constant.)

To avoid losses because of cross currents and other disturbances in hydraulic apparatus, it is necessary to lay the boundaries along stream lines and further to choose those stream lines that will give the least internal losses. For the best design of such apparatus as the diffuser of a centrifugal pump, or if you please, the water lines of a boat, it becomes necessary to know what the stream lines will be under fixed conditions and further what are the conditions that will give the most efficient stream lines, taking into account the losses due to external and internal friction and other losses, the coefficient of which we may be able to learn from the present state of the art. Theory, sure enough, but the question is simply shall we develop and apply theory to our practice, or shall we wait until the Swiss, for example, have developed and applied it and then manufacture under their patents, paying them a tribute for their greater progressiveness.

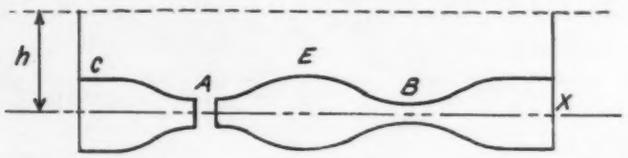


Fig. 1

Referring to Fig. 1, let us take the plane O′ OO″ as horizontal. Since we are dealing with hydraulics, we assume the fluid as incompressible. We shall neglect friction in our preliminary calculations. As ordinates let us choose the distance r along the stream line from its initial point on the line OO′ and the distance S from the axis OO″ measured along a line always at right angles to the stream lines at every point. We will also take first the conditions that V, the velocity, crosses the line OO′ at right angles and is everywhere constant and equal on the line OO′

Taking any element of space dr and ds with velocity V, we can assume V as both a function of r and s, that is

$V = f(r, s)$ when r and s are assumed to be independent values. But then

$$\frac{dr}{dt} = \frac{\phi f(r,s)}{dr}\frac{dr}{dt} + \frac{\phi f(r,s)}{ds}\frac{ds}{dt}$$

Since we have taken dr along a stream line and ds at right angles to dr, then $\frac{ds}{dt}$ must be zero, and thus V is a function only of r considered as an independent variable and therefore under the initial conditions assumed, V must be constant along an s line

Again the quantity,

$dQ = Vds$ .....(1)

and since under the conditions taken V is constant along s, we may integrate at once with respect to s, and therefore

$Q = Vs$ (2) between OO″ and s or $Q' = V(s - s_1)$ (3)

between the stream line passing through s_0 and s, where both are measured along the same s line.

Equation (2) gives the quantity flowing between OO″ and any streamline. Q is constant for any s sections taken between OO″ and the given streamline and thus

$Q = Vs =$ a constant is the equation of a stream line.

If the equation of one boundary is $r_0 = f(s_0)$ . . (4) we get

$$Q_0 = Vs_0 \quad \ldots\ldots(5)$$

When Q_0 is the total quantity flowing, and thus

$$V = \frac{Q_0}{S_0} = \frac{Q}{S} \quad \ldots\ldots(6)$$

The kinetic pressure,

$$P_r = W\left(H - \frac{V^2}{2g}\right) \quad \ldots\ldots(7)$$

And substituting

$$P_r = W\left(H - \frac{Q_0^2}{2g\,s_0}\right) = W\left(H - \frac{Q^2}{2g\,s^2}\right)$$

$$= W\left(H - \frac{Q_0^2 K^2}{2g\,s^2}\right) \quad \ldots\ldots(8)$$

Where $K = \frac{Q}{Q_0} = \frac{s}{s_0}$ . . . . . (9)

H is constant and equal to $\frac{p_0}{W} + \frac{V_0^2}{2g}$ where p_0 and V_0 are the pressure and velocity at the initial point. We are taking the boundary line $r_0 = f(s_0)$ as stationary, so that all stream lines are fixed in space; later we shall take the more general case of movable stream lines, under these conditions the normal force which is

$$dP_n = \frac{W}{g}\,\frac{V^2}{p}\,ds \quad \ldots\ldots(10)$$

does no work. In the above equation γ denotes the radius of curvature at the point taken.

Referring now to Fig (2) where $\alpha\beta$ is again a stream line, and (s) and (s + ds) an adjacent S — lines, we must have

$$Q = Vs = (s + ds)\,(V - dV) \quad \ldots\ldots(11)$$

and therefore,

$$\frac{ds}{s} = \frac{dV}{V} \quad \ldots\ldots(12)$$

and at the boundary

$$\frac{ds_0}{s_0} = \frac{dV}{V} \quad \ldots\ldots(13)$$

and thus again

$$s = K\,s_0 \quad \ldots\ldots(14)$$

If at the initial point $s_0 = a$, $s = b$, then

$$K = \frac{b}{a} \quad \ldots\ldots(15)$$

Whence

$$s_0 = \frac{s}{K} \quad \ldots\ldots(16)$$

and substituting in equation (4)

$$r_0 = f\left(\frac{s}{K}\right) \quad \ldots\ldots(17)$$

Whence

$$\frac{dr_0}{dt} = f'\left(\frac{s}{K}\right)\frac{ds}{dt} \quad \ldots\ldots(18)$$

and since

$$\frac{dr_0}{dt} = \frac{dr}{dt} \text{ on the same s — line} \quad \ldots\ldots(19)$$

$$\frac{dr}{dt} = f'\left(\frac{s}{K}\right)\frac{ds}{dt} \quad \ldots\ldots(20)$$

or $r = f\left(\frac{s}{K}\right) = r_0 = f(s_0)$ . . . . . (21)

The condition K = constant determines a stream line and therefor

$r = f\left(\frac{s}{K}\right)$ with K = any constant is the general equation of a stream line. Thus we see that given one boundary, if the other boundary is also to be on a stream line, the condition of maximum efficiency, its position for any given Q, is at once entirely determined.

The boundary curve is given when K = 1.

By equation (21) we see at once that under the conditions taken, the distance a particle travels from any given s — line, is independent of the particular stream line it travels in.

Since $\frac{dr}{dt}$ is the tangential acceleration and $\frac{V^2}{\gamma}$ the normal acceleration we have

$$\frac{\frac{d^2r}{dt^2}}{\frac{d^2s}{dt^2}} = \frac{\frac{dV}{dt}}{\frac{V^2}{p}}$$

And therefore

$$p = \gamma\,\frac{V^2}{\frac{d^2s}{dt^2}} \quad \ldots\ldots(22)$$

And since

$$S = Ks_0$$

$$Q = KQ_0 \quad \ldots\ldots (23)$$

Therefore,

$$Vs = KQ_0$$

$$\text{or } V = \frac{dr}{dt} = \frac{KQ_0}{s} \quad \ldots\ldots (24)$$

Where Q_0 is an absolute constant and K a variable constant, which becomes absolutely constant only along a stream line.

By equations (20) and (24) we get

$$\frac{dr}{dt} = f'\left(\frac{s}{K}\right) \qquad \frac{ds}{dt} = \frac{KQ_0}{S}$$

$$\text{or } \frac{ds}{dt} = \frac{KQ^2}{s f'\left(\frac{s}{K}\right)} \quad \ldots\ldots (25)$$

Whence

$$\frac{d^2s}{dt^2} = -K^2Q_0^2 \frac{\left[s f''\left(\frac{s}{K}\right) + f'\left(\frac{s}{K}\right)\right]}{s^3\left[f'\left(\frac{s}{K}\right)\right]^3} \quad (26)$$

Substituting this in equation (22) then

$$p = \frac{s\left[f'\left(\frac{s}{K}\right)\right]^3}{\left[s f''\left(\frac{s}{K}\right) + f'\left(\frac{s}{K}\right)\right]} \quad \ldots\ldots (27)$$

And since

$$dP_0 = \frac{W}{g}\frac{d^2s}{dt^2} ds$$

We get

$$dP_0 = -\frac{W K^2 Q_0^2}{g} \frac{\left[(s) f''\left(\frac{s}{K}\right) + f'\left(\frac{s}{K}\right)\right] ds}{s^3\left[f'\left(\frac{s}{K}\right)\right]^3} \quad (28)$$

which gives when integrated along a streamline,

$$P_0 = -\frac{W K^2 Q_0^2}{2g s^2\left[f'\left(\frac{s}{K}\right)\right]^2} + \text{a constant} \quad \ldots\ldots (29)$$

And if we have $P_0 = O$ when $s = b$, then

$$P_0 = \frac{W K^2 Q_0^2}{2g}\left[\frac{1}{f'\left[f'\left(\frac{b}{K}\right)\right]} - \frac{1}{s^2\left[f'\left(\frac{s}{K}\right)\right]^2}\right]$$

We may here note again that a, W, Q_0 and g are absolute constants, K a variable constant, each value of which determines a stream line, and s a dependent variable, and r an independent variable.

Before proceeding further with our calculations let us examine the condition where s = constant defines a streamline. But we have already found that Vs = constant defines a streamline, therefore V must remain constant, and we also have γ = constant. We thus have the conditions of a liquid passing in a circular bend, or elbow, the liquid entering the elbow at uniform velocity across the section. Whence

$$s_1\omega_1 = (s + ds)\omega_2 \quad \ldots\ldots (31)$$

and the amount of sliding of one streamline on another

$$d' = ds\,\omega\,dt \quad \ldots\ldots (32)$$

$$= \frac{ds\,dr}{s}$$

And if the —coefficient internal friction is ϕ, then the power loss in turning the angle Θ is

$$L = ff\,\phi\,dA\,\Theta\,ds$$

$$= f\,\phi\Theta^2 s\,ds \text{ per unit depth}$$

$$= \phi\,\Theta^2(s_2^2 - s_1^2)$$

Assuming ϕ as constant.

$$\text{If } \Theta = \frac{\pi}{2}$$

then

$$L = \phi\frac{\pi^2}{4}(s_2^2 - s_1^2)$$

Consider now the streamline on the outer boundary, you will note that the internal friction force acts in the direction of the velocity while the external friction force acts oppositely. We will thus have an additional loss due to the formation of vorticii.

The application of these calculations to specific examples, and the extension of these calculations to that of variable velocities along the s — lines, the inclusion of the effects of external and internal friction, and vocticii, and the general condition of movable streamlines will be left for future articles.

An electric shock without actual contact with the wire is possible at high voltages. The striking distance is dependent upon the surface, shape and material, being ½ in. for 11,000 volts and 4.65 in. for 60,000 volts between needle points. For a lineman to approach within such a distance, however, is the height of rashness.

The commercial production of artificial diamonds is improbable in the light of our present knowledge. Moissan's process of suddenly cooling a molten mass of carbon-saturated iron gives only the most minute specimens, and in order to obtain crystals of any size it is necessary to maintain a high temperature and a high pressure long enough for liquid carbon to separate from its matrix without contact with the air. Carbon combines rapidly with oxygen at high temperatures, and passes directly from the solid to the gaseous state under ordinary atmospheric conditions.

PERSONNEL OF PUBLIC SERVICE COMMISSIONS.

BY GEO L. MYERS.

Regulation is no longer a subject of contention between party leaders or political parties, if it really ever was, and it is not, in any sense, a partisan question. It is only a political issue in relation to the so-called "trust problem," or in its proposed application to industrial corporations. The progressive party accepts monopoly in the field of industry and endorses regulation,the Democratic party positively refuses to do so, contending that competition should do the regulating. In its relation to public service corporations it is a question concerning which practically all people take common ground. Our changed social and economic conditions made it necessary, together with a growing recognition of the principle that public utilities are natural monopolies possessed of large powers, existent and potential. However, if regulation is to be successful we must have the right kind of regulation, regulation that is fair to the public and fair to the public service corporations.

Much study and consideration has been given to the provisions of public utility laws in order to insure effective regulation and too little study and consideration to the personnel of public utility commissions. The kind of regulation that is to be had is entirely dependent upon the efficiency of the commissioners who do the regulating. If there is not an efficient and competent commission there cannot be efficient and proper regulation. The personal equation is all important and of the utmost concern to both the public and the public utility corporations.

A public utility commission is essentially an administrative and quasi-judicial body in which is vested vast powers of regulation and control, even to the extent of exercising close supervision and direction of the affairs of public service corporations. Control without responsibility is inconsistent. Therefore it is necessary that men possessed of a sense of responsibility comprise the commission, men who can be fair and just to the corporations as well as to the public and impartial and unbiased in their attitude and capable of judging of the merits and facts involved in cases with which they have to deal.

As conditions exist, politics have too much influence in the make-up of commissions. A commissioner is often appointed as a regard for political services rendered the appointive power or because of his political affiliations. Again, in some cases geographical considerations enter into the selection of a commissioner. Sometimes he is appointed to strengthen the chief executive in a given locality, or because of other local considerations, or elected by districts so as to insure district representation on the commission. This is often conducive to the selection of commissioners who are apt to be unfit or to the elimination of men better qualified. The commission is not of local concern, but it is of state-wide concern, and its personnel should not be based upon district representation, and any man appointed or elected should be considered sufficiently broad-gauged and liberal minded to give due and impartial consideration to the entire state in the performance of his duties. Neither politics nor geographical considerations should govern, only ability qualifications and experience. If political considerations make possible his appointment or election such considerations are very likely to govern his conduct as a commissioner. Thus in playing politics he is liable to be unjust to either the public or the public service corporations. No good reasons can be given for politics having anything to do with his selection. Certainly it will not make him more efficient and faithful, and no political principles or issues are to be advanced or sustained. His function is merely to administer the law as enacted regarding public service companies, and it makes no difference what the provisions of the law are, they must be carried out and enforced regardless of the commissioner's political affiliations, and he should not be influenced because of political ambitions or petty partisanship in issuing an order, establishing a rule or rendering a decision. The commission should not be a political clearing house. If it is the public service corporations are going to be the goat and they cannot labor under disadvantages or be subject to unjust burdens without the public suffering with them in consequence, and the only one who will not suffer will be the commissioner who profits because of having used his office for political purposes. Politics do not aid, but actually prevent impartial action, and it is positively necessary that the commission be non-partisan if the best kind of service is to be rendered.

Furthermore, under our present method of choosing commissioners there is a lack of permanency because of politics. If one party is shorn of power and superseded by another, it generally results in a change of a commissioner or two, and in some cases, a change in the entire personnel of the commission, and especially if it is appointive. Thus a man scarcely becomes familiar with the duties of his office, conversant with the public utility laws and educated in the regulation of public utility corporations before he is deprived of office, not necessarily because he is incompetent and inefficient, but due to his not being affiliated with the party in power. Why should the commission be used to educate a man to intelligently perform the duties of his office and enlighten him as to the fundamentals governing public utility regulation and then summarily dismiss him because of his political convictions? Such a condition is ridiculous and absurd. It results detrimentally to the public and the public utility corporations and it is impossible to get down to a satisfactory basis of regulation before another change ensues. If a person were placed at the head of a large public utility or industrial corporation and discharged when he had become familiar with the duties of his office and efficient in performing them and such policy were continued, it would not be long before the organization would become helplessly disorganized and in exceedingly straitened circumstances. The time has come when the people are demanding more in the way of service and that is why they should select the commissioners and do so in such a manner as to leave out of consideration entirely any question of politics as they are now doing in numerous municipalities under commission government, which has proved so

eminently satisfactory that resort has never been had in a single instance to the old political and ward system.

The Interstate Commerce Commission is a success and has the confidence of the public because it is non-partisan in character, composed of men of ability, capacity, knowledge and experience, and is subject to few changes in its personnel. There have been few changes since its inception and since its membership was enlarged. No public body has more difficult duties to perform and none performs them with a greater sense of responsibility to the public and with more regard for the interests of the common carriers. The national commission itself is a powerful argument for non-partisan state commissions.

We are never going to get the right kind of results through regulation unless we give regulation an opportunity to demonstrate and prove its effectiveness and get it down to a fair, business-like and scientific basis so that all parties concerned can get intelligent, just and impartial consideration by a commission of experience and learning having due regard for the rights of the public and a comprehension of the conditions under which a public utility corporation operates.

Mention has been made of a condition. If there is opportunity for improvement or an undesirable condition to be rectified, the question naturally arises as to what is the remedy.

1. The commission should be elected at large by all the qualified voters of the state. This will eliminate appointment by the governor or election by districts.

2. The election should be strictly non-partisan and no party or other political designation should appear on the ballot after a candidate's name. In a good many of the states judicial officers are selected in a non-partisan manner and it would seem better if the name of the candidate for commissioner could appear on a separate ballot along with those of candidates for judicial offices.

3. The election of no more than one or two commissioners biennially.

4. The preferential system of voting should be adopted. This for the reason that it makes possible the selection of a candidate by a majority vote and tends to eliminate the possibility of the election of a candidate who may be unfit, but who has a large personal following. It has a tendency to make the electorate more non-partisan and discriminating in its selection and more probable the selection of a candidate better qualified and more capable. In instances where the preferential system does not meet with approval the non-partisan elimination primary system should be adopted.

5. The recall should be effective in all cases, more especially where the term is for a period of four or six years. This will be the answer to the opponents of the long term because it will make possible the retirement of an obnoxious commissioner at any time.

6. The term of a commissioner should be six years. This makes it possible for him to become reasonably familiar with the public utility laws and the problems affecting regulation. In most of the states the commission consists of three members. This would make necessary the election of only one commissioner at an election. In no state is the membership more than twice the number of years of such a term, thus making it necessary to elect at one time no more than two commissioners.

7. The payment of an adequate salary so that the best services can be obtained and experienced, learned and capable men induced to become candidates. Too often the services demanded and required of a particular officer are totally out of proportion to the salary paid by the state and prevent the acceptance of office by men who are practical and experienced and who have been successful and have a proper conception of business methods and administration.

It would be impractical and undesirable to apply civil service rules and regulations because of the nature of the duties performed by a commissioner, but the method of selection should be such that his tenure of office would depend upon merit and service rendered.

In any event the chief executive should not be vested with the power of appointment. If he is, the appointment will be determined by politics and the commission's personnel at all times uncertain and changing. If it is not as a reward for political services rendered it will be because of the appointee's political affiliations, and regardless of how well qualified the incumbent may be by reason of ability and experience he will be unlikely to retain his office. Again, as previously mentioned, the appointment is liable to be made as a means of strengthening the appointive power or more firmly assuring his tenure of office. The method of appointment would be preferable if it were not for the fact that there is so much politics connected with it.

The unfortunate feature of regulation as it exists at the present time is the probability under our present methods of commissioners being chosen who are totally unfit and absolutely unqualified to serve and who are unfamiliar with the intricacies and problems involved in the regulation of public service corporations.

The pointing out of a condition and the suggestion of a possible remedy should not be construed as a reflection on any commission. No doubt a majority of the commissions consist of men of ability, learning and experience and men who are fair and reasonable, or at least endeavor to be so. However, there should be an effort at all times to eliminate from the blighting influence of partisan politics all public offices that have to do principally with the administration or interpretation of the laws. Of course, there are exceptions, but there are none as to the judiciary. The exceptions exist where the functions of the office have a close relationship with the recommendation or disapproval of legislation, or where there is involved in the selection of a public officer the advocacy and enunciation of certain principles and the adoption of definite policies affecting state government, as, for instance, the governorship of a state. It is even beginning to be questioned and doubted by many citizens that it is necessary that we concern ourselves at all with partisan politics in the government of a state, as is evinced by the agitation for the application to state government of the commission form.

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The Induction Generator

When an induction motor is driven above the speed of synchronism by means of some prime mover it acts as a generator and returns power to the line. Such action for instance, may take place with the three-phase motors on the electric locomotives in the Cascade electrification of the Great Northern Railway, when a train is running down hill at high speed. The motor then becomes a generator in accordance with the general rule of the reversibility of dynamo electric machinery. While this fact has long been known its commercial application has lain dormant until sufficient need developed for the use of induction generators. As they are much less affected by speed variations they are particularly well adapted to be driven by gas engines. Furthermore they may be used to correct some of the troubles due to the tandem operation of alternating current generators on an alternating current system.

A crude conception of the conditions existing in such a system may be gained by comparing it with one of the 20-mule borax teams which an enterprising manufacturer has made familiar to all. Assume that the mules are the generators and the wagons the load, which varies with the grade; let the speed of the team correspond to the voltage of the system and its pulling ability to the current; let the leading wattless current be represented by the activity of the leaders and the lagging wattless component by the inertness of the wheelers.

The freighter with his jerk line controls his leaders just as a governor adjusts the synchronous generator to load variations. These leaders are the most active animals in the team and stir up their more sluggish followers, especially the wheelers. Incidentally they would be just as well adapted to haul a light buggy as to be driven in tandem with a heavy team. Yet if they come to a sudden steep hill they are not good pullers but commence see-sawing back and forth and may lose the load entirely, while on the down grade they are likely to run away and wreck the outfit. They require some steadying and soothing influence, something that will pull harder on the up-grade and hold back on the down. This is provided by the wheelers, who work well in tandem but are too slow and lazy to be driven alone, being mere machines giving power to the team but having nothing to do with its rate of travel.

By imagining that synchronous generators are the leaders and induction generators the wheelers the reader should be able to get a mental picture of the functions of these two types of machines. The induction generator gives current only when connected to a system containing synchronous machines and it has no independent voltage. It merely feeds power into the system and does not participate in the voltage regulation. The synchronous generator gives almost unlimited current on a short circuit, cor-

responding to the leaders on a down grade, but the induction generator ceases to generate when short circuited. Synchronous generators supply both wattless and power current, while the induction machine supplies only power current.

Together they make a good team, one reinforcing the weakness of the other. The induction generator is becoming of industrial importance, the most notable installation being four 7500 kw. units installed in the power plant of the Interborough Rapid Transit Company of New York City. Others are contemplated in the near future, the application being made as the need develops.

Exploiting the Public Needs

Municipal ownership of electric power plants is being carefully investigated in every State from the Rockies to the Coast. So many cities and towns are considering this step that it cannot be regarded as endemic, or peculiar to any one locality and dependent upon local conditions. Whatever may be the causes of which this agitation is the effect, they are certainly widespread and deep-rooted. The seeds of public dissatisfaction with private ownership of public utilities were planted years ago by the men whose successors are now reaping the whirlwind. Before the public will heed the warnings as to the dangers of municipal ownership, their minds must be disabused of the past evils of private ownership.

Of these the greatest has been the exploitation of the public's needs. Instead of being served they were often utilized for selfish purposes. If a franchise which was originally granted to meet the pressing demands for service to consumers is made the basis for increased capitalization, if the immediate needs of a community are supplied at exorbitant rates, if public officials are bribed, juries "fixed" or elections manipulated by corporation influence, a public utility becomes a private utilization. To advocate an "open town" in order that "owl" cars may prove profitable or that electric light and power may be used all night, is not in accord with the general public welfare. Such practices cannot but bring a company into disrepute and lay the foundation for future trouble. The public's needs should be served, not exploited.

We well understand that the public service corporation has usually been an unwilling party to such corruptions and has been "held up" by predatory politicians, who are the real root of the evil. It is hoped that by transferring the regulative and rate-making powers to State commissions much of this local exploitation of the public's needs can be obviated. Such commissions have now been established in every State except Utah and Delaware, and in the future should be strong factors in re-establishing public confidence in public utility corporations. Likewise in subjecting municipal projects to the same regulation the public's interests can be adequately protected.

Progress of Hydroelectric Design

Great changes have taken place in the design and construction of hydroelectric power plants since the pioneer developments were made on the Pacific Coast about ten years ago. These changes have all tended towards permanency and efficiency, so that the new model plants should last longer and accomplish more than their protoypes.

One great improvement has been the growing tendency to regard the central station as an integral part of the network instead of as an isolated building whose design and construction is not related to that of any other part of the system. This has been made possible by the development of remote control apparatus, which makes for a simplicity in operation and an approach to that ideal of being fool-proof hitherto unattainable. The higher voltages, also, have increased the size of the buildings so as to accommodate the wealth of high-tension apparatus which has been developed to meet these requirements. The transformer and switching apparatus of a modern plant occupies fully as much space as the generating machinery, which has been subjected to a corresponding reduction in size and weight due to greater refinements in design. A modern generator capable of developing 10,000 kw. is only about three times as large and heavy as the old 1000 kw. machine. Improved ventilation has been an important contributing factor in this evolution.

But even paramount to increased efficiency is the longer life and the greater insurance for continuity of service resulting from the more permanent construction which has replaced the earlier work. The concrete water conduit and the steel transmission tower is being substituted for the wooden flume and the wooden pole line wherever possible.

The wooden flume and the old earthen ditch were at one time the weakest link in the great chain by which the power of falling water is converted into electric light. Steel pipe lines and concrete-lined ditches, while higher in first cost, are more economical in the end. The water lost by seepage and evaporation alone is often sufficient to develop enough power to warrant the additional investment necessary to prevent it. The cost of generating steam power for the few days that water may not be available because of ditch failure more than compensates for the cost of any precaution which will obviate such a state of affairs.

The advantages of a steel tower line over wooden poles for a long transmission are so obvious as to require little comment. Fewer insulators give less opportunity for current leakage and longer spans greatly reduce construction costs. The longer life of steel coupled with the growing scarcity of poles, make the use of the latter inadvisable except for temporary installations. While many other changes are gradually being made, these in the main constitute the essential features of the past decade's development and point the way for the next few years' progress.

PERSONALS

ITEMS FOR THIS DEPARTMENT ARE SOLICITED FROM ALL READERS

H. E. Sanderson, Pacific Coast manager for the Bryant Electric Company, is at Los Angeles.

Frank J. Quinn, Pacific Coast manager Manhattan Electric Supply Company, was at Seattle recently.

J. H. Herr, sales engineer with the Sprague Electric Works at San Francisco, is making a trip throughout the East.

A. E. Rowe, sales manager for the Telephone Electric Equipment Company, San Francisco, spent the week on a business trip to Sacramento and vicinity.

S. L. Nicholson, general sales manager of the Westinghouse Electric and Manufacturing Company, Pittsburgh, Pa., is in Southern California, en route East.

Chas. H. Pierson, publicity manager of the Southern California Edison Company, Los Angeles, and editor of Current Topics, was a visitor to San Francisco during the past week.

M. F. Steele of the Benjamin Electric Company, San Francisco, is making a business trip to Los Angeles and expects to spend two or three weeks in the southern territory.

M. V. Hunt, with the British Columbia Electric Railway Company, Ltd., at Vancouver, B. C., has been elected to the grade of member in the American Institute of Electrical Engineers.

C. O. Poole, chief engineer for the Southern Sierras Power Company, at Riverside, Cal., has been transferred to the grade of Fellow in the American Institute of Electrical Engineers.

H. E. Smoot, son of Senator Reed Smoot, formerly general manager of the Idaho-Utah Electric Company, is now with the Richfield (Utah) Electric Light & Power Company as manager.

A. W. Q. Birtwell, formerly auditor of the Puget Sound Traction, Light & Power Company and now engaged in manufacturing in Massachusetts, is on the Pacific Coast and is expected in Seattle soon.

J. C. McQuiston, manager of the Westinghouse Department of Publicity, and **C. W. Cope** of the same company, left the first part of the week for Southern California en route to Pittsburgh.

Professor C. C. Thomas of the Johns-Hopkins University and inventor of the Thomas electric gas meter, was a recent visitor in San Francisco, leaving for Pasadena, Cal., where he expects to make a visit with his family.

E. M. Cutting, of the Edison Storage Battery Supply Company, San Francisco, returned to town after an extended trip through Montana and expects to leave shortly for a business trip through the Northwest and British Columbia.

G. L. Barker has accepted a position as assistant manager of Eccles & Smith Company, dealers in electric railway supplies, San Francisco, to succeed **F. F. Bodler,** resigned. Mr. Barker was formerly connected with the San Jose Railway Company, where he won many friends who wish him success in his new position.

H. A. Straus, president of the H. A. Straus Company of Chicago, who handled the engineering for the electrification of the Bamberger line between Salt Lake and Ogden, was a visitor in Salt Lake last week. He was rather reticent as to the purpose of his visit, but stated that Eastern capital are prepared to develop the hydro-carbon deposits in Uintan county. Also that he has several irrigation and water power projects of considerable magnitude under consideration.

C. M. Bliven, agent in charge of the Seattle office, General Electric Company, has left for San Francisco, where he will take up permanent work for the company at that point. **H. E. Plank,** turbine specialist connected with the Portland office of the company, will succeed him at Seattle. The boys of the local office, Western Electric and Pacific States local offices, gave Mr. Bliven a farewell luncheon at the Butler Hotel and presented him with a pair of handsome pipes as a token of esteem.

J. E. Boesch, distributing engineer, British Columbia Electric Railway, Vancouver, B. C.; **R. Cornick,** contracting engineer, Vancouver, B. C.; **Glendower Dunbar,** chief electric engineer and assistant superintendent, city Lighting Department, Seattle, Wash.; **Carl A. Heinze,** assistant electrical engineer, Bureau of Los Angeles Aqueduct, Los Angeles, Cal.; **S. E. Hutton,** consulting engineer (electrical and mechanical) Moscow, Idaho; **H. B. Lynch,** manager electric light plant, Glendale, Cal., and **R. H. Manahan,** city electrician, Los Angeles, Cal., have been transferred to the grade of member in the American Institute of Electrical Engineers.

F. L. Annable, formerly superintendent of the northern division of the Pacific Electric Railway at Los Angeles, has been appointed to the newly-created position of general superintendent in charge of operations. **A. C. Bradley,** superintendent of the San Bernardino division, succeeds Mr. Annable, while **M. P. Groftholdt,** superintendent of the Riverside Division, will have his jurisdiction extended over the San Bernardino Division. This combining of the San Bernardino and Riverside divisions creates a new division to be known as the Eastern Division, with offices at both San Bernardino and Riverside. As a part of the general plan to tighten up the operating system as a result of the general growth of the Pacific Electric, **Edwin Clark,** who has been assistant superintendent of the Northern Division, is transferred to the Western Division in the same capacity, where the constantly increasing beach travel makes increased supervision a necessity. **H. E. Rodenhouse,** a former assistant superintendent for the road, takes Clark's old place on the Northern Division.

H. P. Bubke, substation operator, Spokane & Inland Empire Railroad, Spokane, Wash.; **Paul Bucher,** engineer, Pacific Gas & Electric Company, San Francisco, Cal.; **Fred W. Carlson,** inside installation work, Helena Electric Company, Helena, Mont., **Albert H. Harford,** manager, Municipal Light & Power Company, San Francisco, Cal.; **Laurence G. Hendry,** manager Hendry-Crossman Electric Company, Ltd., Vancouver, B. C.; **Willoughby Jno. Henry,** engineer, Vancouver, B. C.; **Edward Holder,** district representative, sales department, British Columbia Electric Railway Company, Ltd., Vancouver, B. C.; **Hubert D. Long,** Utah Power & Light Company, Salt Lake City, Utah; **C. J. Macke,** electrical engineer, McCleary, Wash.; **Ferdinand C. Miller Jr.,** superintendent of electricity, Powell River Company, Ltd., Powell River, B. C.; **L. J. Pospisil,** engineer in charge of designs, Washington Water Power Company, Spokane, Wash.; **Thos. Anthony Purton,** draughtsman, electrical engineering department, Oregon Short Line Railroad, Salt Lake City, Utah; **Franklin L. Rohrbach,** engineer in charge of underground system, Washington Water Power Company, Spokane, Wash.; **Gavin T. Scouler,** assistant inspector of gas and electricity, Dominion Government, Vancouver, B. C., and **Torsten G. Winter,** engineer, Western Canada Power Company, Vancouver, B. C., have been elected associates in the American Institute of Electrical Engineers.

OBITUARY.

F. V. T. Lee died on August 18th at Victoria, B. C., from pneumonia. His death has come with a suddenness which stuns his many friends throughout the country, particularly as he had but recently renewed many old acquaintances. His interests were so diversified and his attainments were so great that there are but few electrical men to whom he was not known with respect and to whom his passing will not be a distinct loss.

Francis Valentine Toldevy Lee was born at Winchester, England, in 1870, receiving his early education in Europe, but coming to America in 1887. At twenty years of age he entered the employ of the Manhattan Electric Co., becoming assistant to the superintendent, when he realized the necessity for a knowledge of electrical theory three years later. Entering Stanford University in 1893, he graduated in 1896,

F. V. T. Lee.

also being assistant to the late Dr. A. C. Perrine, who at that time was editor of the Journal of Electricity, Power & Gas, as well as professor of electrical engineering.

As an associate of John Martin in the firm of John Martin & Co. (now Pierson, Roeding & Co.), he supplied the equipment for many of the early hydroelectric installations on the Pacific Coast. In 1906 he became assistant to the president of the Pacific Gas & Electric Company, remaining as a stalwart aid during the four years following. He resigned early in 1910 to look after his private interests. He was a member of many engineering societies in this country and abroad, as well as of the Masonic fraternity. He is survived by a wife and two daughters.

This brief record of dates is utterly inadequate to reflect the great living personality of the man behind them. "We live in deeds, not years; in thoughts, not breaths; in feelings, not in figures on the dial." He was a man who made strong friends and kept them because of his sterling qualities. Their one comfort in his untimely death is its merciful ending.

RAILROAD COMMISSION OF OREGON.

At 10:30 a. m. on August 12th representatives of all the various public utilities companies, underwriters, inspectors, etc., met in open conference at Salem. The tentative rules were subjected to a thorough grilling. About the first of the month the commission intends to have the rules in final shape for promulgation.

PROGRAM PACIFIC COAST CONVENTION AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, VANCOUVER, B. C., SEPT. 9, 10, 11.

Tuesday, Sept. 9th.

Morning: Office open for registration.

Opening meeting. Address of welcome by Premier of British Columbia, followed by Paper and discussion: "Snow and Ice Loading on Transmission Lines," V. M. Greisser.

Afternoon: Paper and discussion: "Mountain Railway Electrification," A. H. Babcock.

Automobile and car trips, seeing Vancouver, for the ladies of the party.

Evening: To be left free for theaters and private entertainment.

Wednesday, Sept. 10th.

Morning: Paper and discussion: "The Gulf of Georgia Submarine Telephone Cable," E. P. LaBelle and L. P. Crim.

Afternoon: Paper and discussion: "A Modern Substation in the Coeur d'Alene Mining District," J. B. Fisken.

Automobile drive to Capilano Canyon for the ladies.

Evening: Illustrated Lecture.

Thursday, Sept. 11th.

Morning: Paper and discussion: "Logging by Electricity," E. J. Barry.

Afternoon: Paper and discussion: "High-Voltage Circuit Breakers," K. C. Randall.

Automobile drive for the ladies around Stanley Park and Marine Drive, followed by tea party.

Evening: Banquet.

Friday, Sept. 12th.

Rail and Lake Excursion to New Generating Station of the Western Canada Power Company, at Stave Falls.

Saturday, Sept. 13th.

Boat Excursion to New Generating Station of the B. C. Electric Railway Company at Lake Buntzen.

NEWS OF CALIFORNIA RAILROAD COMMISSION.

The Great Western Power Company has applied to the railroad commission for a modification of the order made by the commission in March, giving the utility permission to issue its first mortgage 5 per cent forty-year sinking fund gold bonds of the par value of $4,411,000. The company now desires to make slight variations in the improvements and extensions to be made from the money derived from the bonds. The company has revised its estimated expenditures, which now take the following form:

Additions and improvements to the distribution system, including pole lines, transformers, regulators, meters, etc., in the counties of Alameda, Contra Costa, Sacramento, Solano, Sonoma and Napa, and in the cities and towns therein; cables under Carquinez straits and the bay of San Francisco, substation at Denverton, additions to substations at Napa and Sacramento, warehouse and garage at Petaluma, equipment of office at Napa, $1,059,040.85.

Additions and improvements to transmission system, including fifteen miles of 100-kilowatt tower line; substation at Antioch, additions to substation at Cowell, Clayton and Brighton, $145,312.

Additions and improvements to the production system, including the completion of the Big Bend development, synchronous condenser at Oakland steam plant, $685,727.

Additions and improvements to the lands appurtenant to the hydroelectric development, including acquisition of lands in Big Meadows, $200,000.

Additions and improvements for general utility purposes, including cable barge, $18,300.

Completion of gravity section type dam at Big Meadows, $1,607,635.

Reimbursement for capital expenditures, $280,783.

The commission has issued an order permitting the Western Electric Company to sell its telephone exchange plants at Portola, Plumas county, to the Pacific Telephone & Telegraph Company for $466.31.

The Ventura County Power Company has been given permission to sell the Oxnard Water Works system to the city of Oxnard for $30,000.

The Pacific Telephone & Telegraph Company has applied for authority to withdraw from the territory at Farmington, and the Farmington Telephone Association has applied for authority to enter this territory.

The Lindsay Home Telephone & Telegraph Company has been authorized to issue 1644 shares of its capital stock of the par value of $1644, said stock to be issued in exchange for property acquired by the company.

The commission has denied the application of the Oro Electric Corporation for a rehearing of the decision of the commission upon the application of that company for permission to serve certain portions of San Joaquin county and the city of Stockton. There is no opinion accompanying the order denying the rehearing.

The commission issued a supplemental order approving a slight alteration in the terms of a general lien mortgage which the Pacific Gas & Electric Company has been permitted to execute to the Guaranty Trust Company of New York and William C. Cox to secure a $5,000,000 issue of 6 per cent ten-year convertible general lien gold bonds. The alteration in the terms of the mortgage permits the individual trustees as well as the corporate trustees to exclude and deliver the bonds.

The commission has rendered a decision permitting the Tulare County Power Company to issue ten promissory notes in the aggregate face value of $50,000, secured by 133 6 per cent bonds of the par value of $66,500. The notes authorized are to replace ten similar notes now held by Thomas C. Job. The commission denied the application of the company to pledge eight of its 6 per cent refunding bonds of the par value of $4000 to secure $3243 interest on the notes held by Job.

ELECTRICAL CONTRACTORS' NOTES.

The Electric Fixture & Supply Company, 117 Marion street, Seattle, has secured an order from the government for installing approximately $400 worth of fixtures in officers' quarters at the navy yard, Bremerton.

J. J. Agutter & Company, Seattle, have secured the contract for general electrical installations in the Ford Motor Car Company plant being constructed there, at $7000.

The Columbia Electric Company, Seattle, is doing the electrical work in the West Woodland school, the Lake school and the J. P. Jones apartment building.

The electrical contract for the new Pacific Telephone & Telegraph Company's new building on the southeast corner of Oak and Park streets, Portland, Oregon, has been let to the Pacific Fire Extinguisher Company. They have also obtained the electrical contract for the new Supreme Court Building in Salem, Oregon.

The electrical contract for the new Troy laundry, located on E. Tenth and E. Pine streets, Portland, Oregon, has been taken over by Fred H. Kaltz, 218 Worcester Building, Portland, Oregon. The Petler Electric Company had this contract but due to Mr. Petler's death the contract has been transferred to Mr. Kaltz. This is to be the finest electrically driven laundry in the northwest.

SEATTLE POWERLESS TO REGULATE UTILITIES.

Judge Frank H. Rudkin of the United States District Court recently held, while sitting at Seattle, that the city exceeded its powers two years ago when it passed an ordinance requiring the Seattle Electric Company, now the local division of the Puget Sound Traction, Light & Power Company, to sell commutation tickets on all street cars operated by it within the city limits. A permanent injunction was granted against the enforcement of the order by the city. At the same time the court held that the act of the state legislature approved March 18, 1911, commonly known as the public service commission law, took away and superseded the power of municipalities of the first class to enact such ordinances. Damages sought by the company at the rate of $5000 per month since the beginning of the suit against the city and amounting to about $100,000 were denied by the court on the ground that the municipality on making its ordinances was exercising a purely governmental function. It is announced that the city will take an appeal to the circuit court of appeals to determine whether the city has been stripped of its power to regulate public utilities.

TRADE NOTES.

James O'Brien, San Francisco, has received the contract for an $80,000 dam for the Yolo Water & Power Company, at Cache Creek, Lake county, Cal. The dam will be 40 ft. high and 200 ft. long across the crest.

The Berkeley Electric Cooker Company, Berkeley, Cal., has received orders for 50 Type C cookers each from the L. C. Converse Company, Denver, Colo., and Norris & Evans, Kansas City, Mo.

Chas. C. Moore & Company, Seattle, have procured the contract for Stirling boilers, piping, heating, etc., to be used in connection with the reconstruction of the steam heating plant of the Missoula Light & Water Company, Missoula, Montana.

The Seattle office of Pierson, Roeding & Company has secured a contract for supplying the city of Kamloops, B. C., with high-tension insulators and pins and steel reinforced aluminum cable for a 43-mile transmission line from the Barriere River to Kamloops.

The Los Angeles Gas & Electric Corporation, Los Angeles, Cal., have bought one 300 kw. motor-generator set consisting of one 250-125-volt, 3-wire, d.c. generator direct-connected to one 2400-volt, 3-phase, 60-cycle, 870 r.p.m. induction motor from the Westinghouse Electric & Manufacturing Company.

The Joshua Hendy Iron Works, San Francisco, shipped last week to the Alaska-Gastineau Mining Company, Juneau, Alaska, a 600 h.p. tangential water wheel to be used in this company's hydroelectric development. One unit will be installed at present but provisions are being made for further development.

The Pacific States Electric Company advise the adoption of Union pressed steel lamp standards by the city of Berkeley, Cal. An installation of electroliers has just been completed on University avenue. The United States Government has also been a recent purchaser of Union metal lamp standards, most notable among the installations being that at Fort Mason, San Francisco.

BOOK REVIEW.

The D'Este Steam Engineers' Manual, with Electrical Appendix. By Charles Penrose; 513 pp.; 5x7½ in.; flexible black leather. Published by Julian D'Este Company, 24 Canal street, Boston, Mass., and for sale by Technical Book Shop, San Francisco. Price $2.00.

This text comprises one of the most practical compendiums on steam and electrical engineering which has been published. It is divided into two sections, a steam and an electrical. The information given is within the comprehension of the steam engineer and should prove invaluable for reference and study. A unique feature in the electrical section is the use of many illustrations of recent types of equipment of various makes. While issued as an advertisement for a number of steam engineering specialties it gives much more for the money than is usually found in a book of this low price.

INDUSTRIAL

A NEW TROLLEY CATCHER.

The Ohio Brass Company of Mansfield, Ohio, is marketing a new trolley catcher. Fig. 2 shows the principal parts of the operating mechanism. Three dogs, mounted on the back of the reel are thrown outward by centrifugal force when the trolley wheel jumps. One dog rides over the guide (A-B) and engages the stop at (B). Under normal conditions, these dogs are held in toward the center by rugged coiled springs

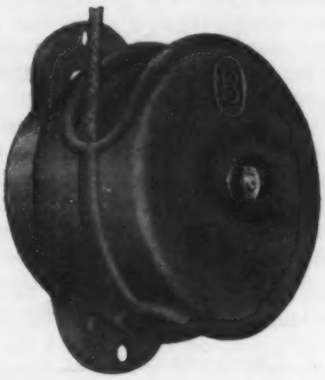


Fig. 1. O-B Trolley Catcher.

which are enameled to prevent rusting. In operation the coiled springs are only slightly extended, insuring long life. The main operating spring is enclosed in the extreme back part of the case.

All parts are made sufficiently rugged to withstand the abuse which such a device usually gets in service. The case is made of malleable iron, enameled. A large opening is provided at the bottom to drain off moisture.

A separate base casting is bolted directly to the car dash and the catcher can be quickly inserted in the base and held

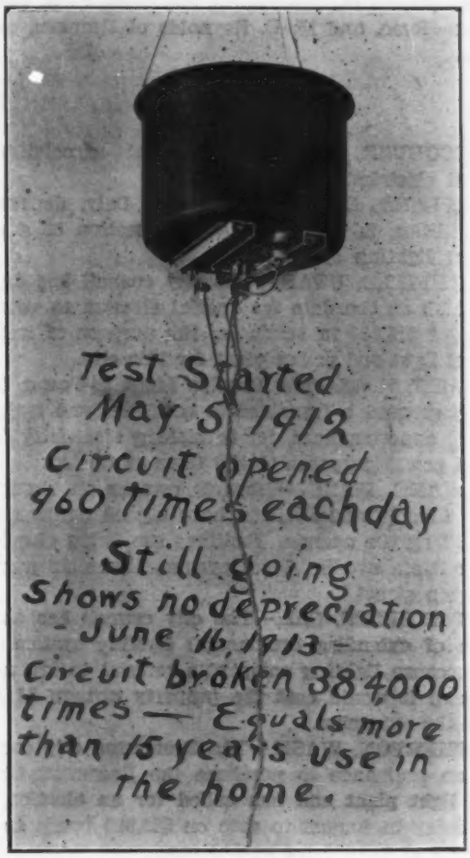
Fig. 2. Phantom View.

in place by a spring operated catch. For double end operation, a base is installed on each end of the car and one catcher used.

One of the aims of the designers was to eliminate stepping up or climbing of the trolley pole after the rebound which follows the sudden stopping of a flying pole. This was accomplished by means of the guide A-B. The dog which engages the stop at (B) rides over this guide and cannot be pulled back toward the center by its spring until the rope has been wound in sufficiently to allow the dog to travel backward on the guide to the point (A). Exhaustive service tests proved that the rebound will never be sufficient to cause this to happen. In other words, when the trolley wheel jumps, the O-B Catcher catches the pole quickly and holds it when caught.

AN INTERESTING TEST.

The accompanying illustration shows a test which is being conducted by the Berkeley Electric Cooker Company, Berkeley, Cal. The test is interesting in that it demonstrates the reliance which can be placed in automatic de-



Test of Circuit Breaker.

vices when properly constructed. The device is used for breaking the circuit on one of this company's electric cookers and at the time the picture was taken had been in continuous operation for over a year. The carbon contacts breaks a five ampere current and although this operation has been repeated almost a half million times the contacts show practically no deterioration.

NEW CATALOGUES.

The General Electric Company has just issued Bulletin No. A4124, devoted to a detailed description of its Automatic Starters for Alternating Current Motors. The bulletin describes automatic control panels for squirrel cage induction motors and slip ring induction motors, float switches for remote control of automatic starting panels or rheostats, and pressure governor panels, also for remote control. Bulletin A4139 is devoted to Central Station Oil Switches of High Rupturing Capacity, both automatic and non-automatic, for voltages from 15,000 to 70,000fl Bulletin No. A4130, describes Adjustable Speed Direct Current Motors for individual drive or machine tools. Bulletin A4093 illustrates and describes Generators for Electrolytic Work.

NEWS NOTES

INCORPORATIONS.

RAYMOND, WASH.—Willapa Electric Company, $400,000, by J. S. Thornton, R. L. Fisher, et al.

BRUNEAU, IDAHO.—Idaho Southern Telephone Company has been organized to construct and operate a system in Owyhee, Ada, Elmore, Twin Falls, Gooding and Canyon counties; $50,000 capital. W. D. Reynolds, C. B. Faraday of Mountain Home, and M. E. Reynolds of Bruneau, are incorporators.

ILLUMINATION.

VANCOUVER, B. C.—Ratepayers' association favor municipal electric light plant.

PORTLAND, ORE.—Commissioner Daly, department of public utilities, is investigating the question of a complete municipal lighting system.

SMITHFIELD, UTAH.—The city council has designated August 29th as the date for special election to vote on the issuance of $25,000 in bonds for the purpose of installing a municipal light and power plant for this city.

GALLUP, N. M.—The Peoples Light & Power Company has been granted a franchise to construct and maintain all necessary appurtenances, for furnishing electricity for light, heat and power purposes to the town of Gallup.

SPOKANE, WASH.—Property owners on Trent avenue between Lincoln and Division have signed petition for electroliers along the avenue. Petitions are being circulated for lights on Main avenue, First avenue, Riverside avenue and Washington street.

LOS ANGELES, CAL.—The city council has abandoned the idea of extending ornamental lighting system on Pico street, because lighting companies refused to lay necessary cables, and it would cost the property owners $1 per foot to make the extension.

BREMERTON, WASH.—The Bremerton city council has passed an ordinance to purchase the Bremerton-Charleston electric light plant and has called for an election for the last Tuesday in August to vote on $90,000 bonds to pay for the plant and $35,000 for extensions.

SALT LAKE CITY, UTAH.—A movement has been started by the Salt Lake Real Estate Association to induce the city to erect a municipal electric light plant in City Creek Canyon to furnish power for the street arc lighting. W. G. Tuttle of the association is backing the movement.

PARK CITY, UTAH.—The city council has granted to L. A. Jeffs and associates of Salt Lake, a franchise to construct and operate an electric light and power system in this city for a period of 25 years. It is promised that construction work on this new plant will be started at an early date.

IDAHO FALLS, IDAHO.—Mayor Clark has returned to the city after a tour of inspection of electric light plants in southern Idaho. The object of the trip was to gain information regarding the creation and sale of electrical energy for heating and cooking purposes. The capacity of the city plant will in all probability be increased.

OGDEN, UTAH.—The Real Estate Association of this city at its meeting on August 13th, adopted a resolution favoring a municipally owned electric light plant for this city and stating that they will oppose for election any candidate for mayor or commissioner, who will not go on record as favoring the construction of such a plant at the earliest possible moment. S. S. Smith, J. J. Brummit and Geo. Kelly were named as a committee to follow up the agitation for a municipal plant to be constructed in connection with the dam in South Fork Canyon now being installed for city water supply.

OAKLAND, CAL.—Two important recommendations are made to Commissioner Turner in a report submitted by City Electrician Babcock, who recommends that the city's system of gas lighting for the streets be extended to all parts of the city which are densely populated; that a luminous type of lamp be substituted for the present arcs and that the city's electrical department be made independent of the power companies. Babcock says: "To make this department independent of the power companies, I recommend that there be installed in the salt water pumping station a direct connected gas engine unit of sufficient capacity to furnish light and power to the fire alarm department and the pumping plant." Babcock also recommends that the fees of the department be increased so as to make the department pay for itself. In his report Babcock says that during the past year there was a 34 per cent increase in the number of box alarms, and one of 26 in telephone alarms. The city now has 340 miles of copper wire installed on branch lines, providing service to 27 fire companies, 231 fire alarm boxes and 155 police boxes.

TRANSMISSION.

BELLINGHAM, WASH.—The committee investigating the establishing of a municipal power plant on the north fork of Nooksack is favorable.

EATONVILLE, WASH.—The proposition to build a municipal power plant of 100 kilowatts capacity on Lynch Creek carried at the election. Evans Dickson Company, Tacoma, are the engineers.

SEATTLE, WASH.—The Cascade Mining Company has water power rights on Miller River at the town of Benton, about 40 miles from Seattle, has offered these rights to Seattle at $90,000. No survey has yet been made showing to what extent the site may be developed. The offer was referred to the public utilities committee of the city council for investigation.

LOS ANGELES, CAL.—Work on the tunnels that will carry the water from behind the 140-foot dam at Big Creek to the 2100 foot drop that leads to power house No. 1 of the Pacific Light & Power Company, has been resumed. The tunnel at Big Creek is 3½ miles in length and is 12 ft. in diameter. From power house No. 1 the water is carried through a series of tunnels and flumes to the drop above power house No. 2.

EUREKA, CAL.—Frank Langford and his son, Carl, have been granted a right of way for their water canals through the forest reserve, at the big bend of the Klamath River. Secretary of the Interior Lane has granted the petition of the Langfords for a right of way through the national forest and they will now immediately proceed with the construction of their electric power plant at Ishi Pishi Falls. The Langfords hold a right of 500,000 inches of water in the Klamath River and can use as much water as possible without interfering with the government reclamation project at Klamath Falls.

SAN FRANCISCO, CAL.—The trustees of the United Properties have signed an option giving R. G. Hanford until January 1, 1914, to sell control of the United Properties to a British syndicate. Both parties to the deal decline to discuss the matter further than to confirm the fact of the option having been given. Hanford has contended all along that an English syndicate stood ready to take over the property and put into it the money necessary to carry out

the projects outlined at the time the United Properties were organized, and it is understood that he will leave at once for London to close the deal. The option covers also the Smith holdings in the United Properties, said to represent $5,000,000 to $6,000,000.

RIVERSIDE, CAL.—A merger of power systems, four in all, which will furnish current for the operation of industries in western Nevada, the eastern portion of California, and a large part of southern California, is announced by Delos Chappell, president of the Southern Sierras Power Company, who has returned from a trip to Inyo county. The territory to be covered by this system extends from a point as far north and east as Round Mountain in Nevada to Riverside and surrounding towns. The various systems will be connected by the building of a line between Bishop and Lundy Lake. The full connection will be effected by the construction of a line from Bishop to Long Valley by the Silver Lake Power & Irrigation Company, and by an extension to be made by the Pacific Power Company from Long Valley to Lundy Lake. The Silver Lake Power Company has power projects on the Owens River, while the Pacific company has its plant on Lundy Lake. The parent company is the Nevada-California Power Company, which gets its current from a chain of five hydro power plants on Bishop Creek, the source of supply also for the Southern Sierras Power Company.

TRANSPORTATION.

MISSOULA, MONT.—A subscription list has been started to secure a trolley line in Rattlesnake district.

ANACORTES, WASH.—A proposed franchise, giving the Anacortes & Eastern Railway the right to construct and operate a standard gauge railway over certain streets of teh city, has been referred to the streets and park committee.

LOS ANGELES, CAL.—The Los Angeles Railway Company is planning to erect a new car house at Washington and Pacific avenues, to care for increased traffic in the south and west sections of the city. The cost will be about $300,000, and construction work is to begin soon as possible. The building will be of steel and concrete.

PRINEVILLE, ORE.—Negotiations have been closed with H. P. Shell, Tacoma, for the construction of an electric line between Metolius, on the Oregon Trunk railroad and this place. The road will be 30 miles long. T. N. Baldwin, First National Bank, and C. M. Elkins, Crook County Bank, are members of the Prineville committee.

EL PASO, TEXAS.—The right to construct three new street car lines in the city of El Paso has been granted to the El Paso Electric Street Railway Company. The proposed tracks will be constructed on Tenth, Piedras and Hague streets and the company is required to begin work on the lines within two months after approval of the ordinance.

SEATTLE, WASH.—The Puget Sound Traction, Light & Power Company is building ¾ mile of track to connect with the King county industrial district near Georgetown, Washington. This track will be paid for by the county and the first industry to be served will be the Seattle-Astoria Iron Works, a new plant. The Oregon-Washington Railway & Navigation Company is also building considerable track in that neighborhood to connect with the electric line.

OGDEN, UTAH.—The directors of the Ogden Rapid Transit Company have not decided to build the Twenty-seventh street car extension at this time, due largely to the fact that the residents on the avenue between Twenty-fifth and Twenty-seventh streets are opposing the car line there. President M. S. Browning states that the company would have constructed this line before now had it not been for the objections raised by the property owners.

VISALIA, CAL.—The building of the Big Four electric interurban line to connect with Tulare, Visalia, Poplar and Porterville has been officially sanctioned, according to information received here from the State Railroad Commission by Frank Avery, president of the proposed system. Avery declared that construction work will be commenced within ten days and that application for franchises over city streets and local terminals will be made at the next meeting of the council.

SACRAMENTO, CAL.—Two interurban lines now operating into Sacramento—the Northern Electric and Central California Traction Company—are considering the Hanrahan building on the corner of Eighth and L streets, as a possible depot. It is planned to use the ground floor for passenger trains and the upper floor for offices. For some time both railroads have been seeking terminal facilities, as there has been considerable complaint because the cars have stood on Eighth street.

PHOENIX, ARIZ.—The Phoenix Street Railway Company have notified the city council of its refusal to pay its portion of the cost of paving North Second avenue between Washington and Van Buren streets, the petition for which has been made by a majority of the property owners. General Manager Mitchell of the company says that eventually the company will pay its share of the cost of this paving, but it is not convenient to do so at the present time and has decided to leave its tracks as they are. The council has referred the matter to City Attorney J. T. Prescott for advice.

SALT LAKE CITY, UTAH.—S. S. Arentz, chief engineer of the Salt Lake & Ogden Railway Company, the Orem Road, made definite announcement this week that unless unforseen happenings interfered, trains would be running over their lines between Salt Lake and Provo by the first of the year. If this is accomplished, this company will have done a remarkable piece of engineering. With less than three months of construction work past it will require unusual efforts during the remainder of the year to complete the 53 miles of line necessary, including sidings and stretches of double track.

STOCKTON, CAL.—Speaking of the negotiations pending between the Central California Traction line and the Tidewater Southern line by which the latter company plans to operate over the lines of the traction company in order to reach the Stockton waterfront, officials of the Tidewater company emphasize the fact that the negotiations pending in no sense represent a sale of the Stockton-Fresno railroad. The Tidewater Southern has no thought of a sale, but on the other hand are making rapid progress toward getting its road in actual service and hope to have its cars running over Pilgrim street and Weber avenue to the waterfront by October. The real facts of the case are that the Tidewater Southern is being kept out of Stockton by reason of the terms of the city charter.

TELEPHONE AND TELEGRAPH.

ORANGE, CAL.—The city trustees have received communication from the Postal Telegraph Company asking for permission to build lines into Orange along the Pacific Electric right of way, from Santa Ana.

SAN LUIS OBISPO, CAL.—J. H. Verkruzen, right-of-way agent for the Pacific Telephone & Telegraph Company, was here arranging for the removal of all poles from the business section of the city. Work is about to be commenced by a crew of wiremen under the special agent. Agent Verkruzen has secured the right of way and permits from all the property owners in the principal business sections of the city to install conduits, hang cables and install what is known as a "block system." The wires will be removed and overhead lines will only be seen in the outlying districts. Cables containing many wires will be utilized in carrying out the work. These will be hung in the rear of buildings and all telephone connections made either from the rear end of the roof or from the basement.

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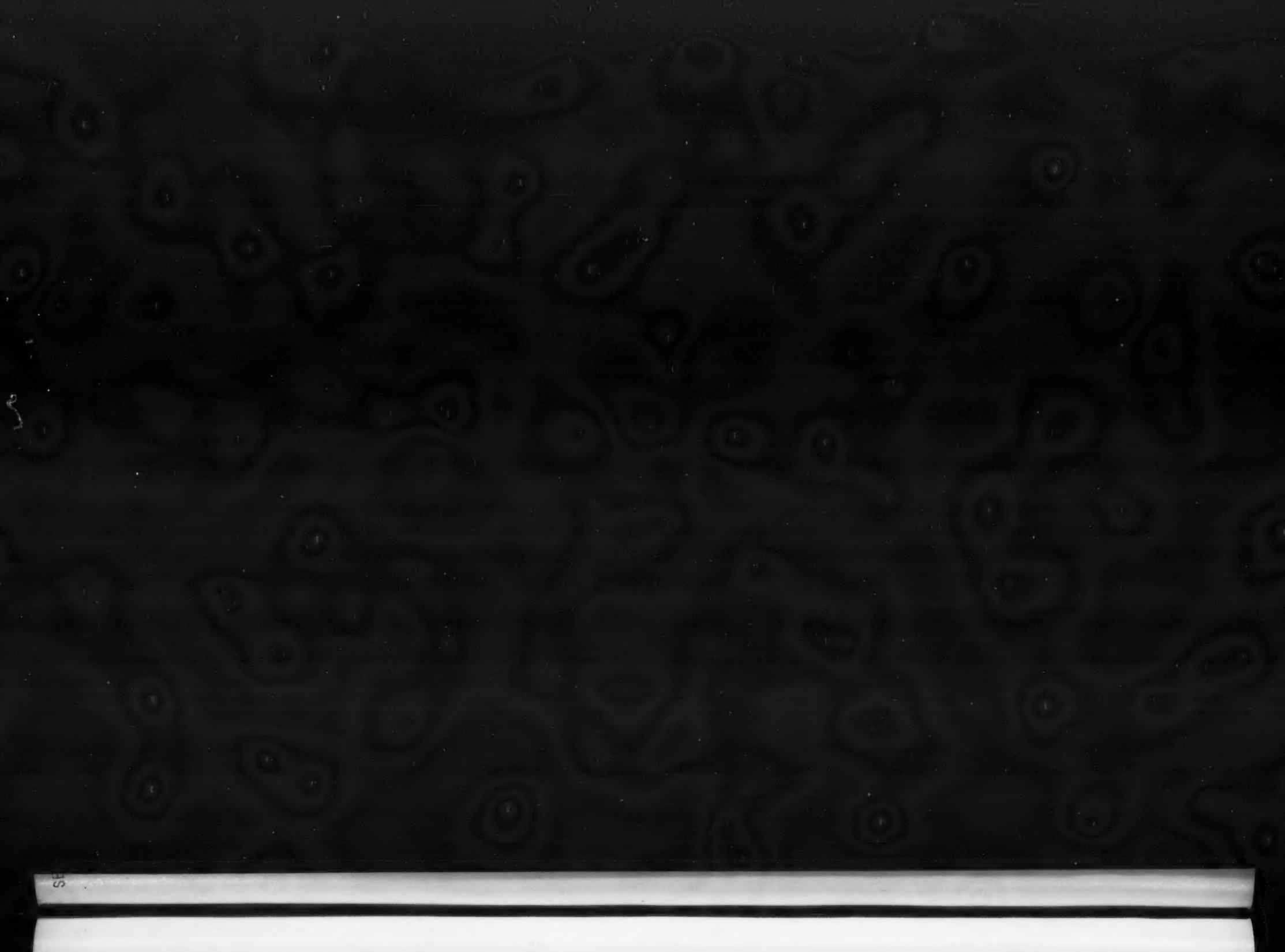
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